

SOUTH-EASTERN REGIONAL HOSPITAL BOARD, SCOTLAND

LABORATORY SERVICES FOR GENERAL PRACTITIONERS



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## SOUTH-EASTERN REGIONAL HOSPITAL BOARD, SCOTLAND

### Laboratory Services available for General Medical Practitioners in the South-Eastern Region (excluding Fife)

This booklet describes the services which are available to General Medical Practitioners throughout the Region (except Fife). The first section lists the investigations which are at present available in each of the major divisions of laboratory medicine and informs practitioners in any area to which laboratory the specimens should be sent.

The subsequent sections, which are on paper of different colours, describe in greater detail the service arrangements for each specialty serving the practice area of the General Practitioner. These areas are as follows:-

#### Area A

City of Edinburgh, Midlothian, East Lothian and Northern parts of the counties of Peebles and Berwick. Most of these services are based on laboratories in Edinburgh.

#### Area B

The Border Counties, and Southern parts of the Counties of Peebles and Berwick. Most of these services are based on the laboratory at Peel Hospital, Galashiels.

#### Area C

West Lothian Area. These services are based on Bangour General Hospital, Broxburn.

The laboratories providing these services are:-

#### AREA A

##### Clinical Chemistry

University Department of Clinical Chemistry, Royal Infirmary of Edinburgh. Tel: FOUNTAINBRIDGE 2477 Ext. 316.

##### Haematology

Department of Haematology, Royal Infirmary of Edinburgh.  
Tel: FOUNTAINBRIDGE 2477 Ext. 241.

Post Mortem Services

University Department of Pathology, Medical School, Teviot Place, Edinburgh. Tel: NEWington 1011 Ext. 2272.

Microbiology (Except East Lothian)

University Department of Bacteriology, Edinburgh University Medical School, Teviot Place, Edinburgh. Tel: NEWington 2542.

Microbiology: East Lothian

East Fortune Hospital Laboratory, East Fortune.  
Tel: Athelstaneford 244.

Central Microbiological Laboratory, Western General Hospital, Edinburgh, 4. Tel: DEAn 1311 Ext. 179.

Blood Transfusion Service

Regional Blood Transfusion Centre, Royal Infirmary of Edinburgh. Tel: FOUntainbridge 7291-4.

Pregnancy Diagnosis

Hormone Laboratory, Simpson Memorial Maternity Pavilion, Royal Infirmary of Edinburgh. Tel: FOUntainbridge 2561.

Cervical Cytology Service

University Gynaecology Department, 39 Chalmers Street, Edinburgh, 3. Tel: NEWington 1011 Ext. 2428

AREA B

Clinical Chemistry	}	The Laboratory, Peel Hospital,
Haematology		Galashiels.
Microbiology		Tel: Galashiels 2295 (OTW6 - 2295)
Blood Transfusion		

AREA C

Clinical Chemistry	}	These should be submitted to the appropriate laboratory at Bangour General Hospital, Broxburn.
Haematology		
Microbiology		
Blood Transfusion		

Tel: Dechmont 334 (DE 66 - 334)

## GENERAL INFORMATION

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GENERAL INFORMATIONSPECIMENS

All specimens must be labelled with the patient's full name and date of withdrawal and a properly completed request form must accompany each specimen. Since many laboratory reports involve the expression of an opinion by a member of the laboratory staff it is only possible for him to do so from an informed standpoint if all relevant clinical data are given on the request form. It is essential to include a brief clinical history together with the probable diagnosis and it is imperative that details of previous and current therapy be included.

Supply and replacement of specimen containers and laboratory forms

For detailed information the coloured section should be studied. In general, replacements may be ordered directly from the laboratory concerned and any special requirements discussed. In the Edinburgh area, forms and containers are available from the distribution points listed on page 50

Obtaining a specimen

Detailed information on obtaining specimens may be found in the coloured section. It is particularly important in the case of bacteriological specimens that the outside of the container should not be contaminated.

Special note on haemolysis

Many tests cannot be carried out on haemolysed specimens of blood. Avoid haemolysis with the following precautions:-

Remove needle from syringe before gently emptying blood into the tube.

Mix the blood with any anti-coagulant present by repeated gentle inversion of stoppered tube.

Avoid presence of water, ether or spirit in syringe or needle.

Transportation of specimens

Speed in transmission is of great importance in almost all specimens if worthwhile results are to be obtained. Certain investigations are, however, more demanding and the specimen should reach the laboratory within an hour. Examples of such tests are the examination of vaginal swabs for Trichomonas vaginalis, and the cultivation of delicate bacteria such as gonococci and meningococci.

Stuart's transport medium is useful in such instances.

Certain biochemical examinations demand the separation of serum from blood samples at the earliest opportunity. Such tests include the estimation of serum potassium and acid phosphatase (Stability "C" in table).

There are a number of tests which can still be performed up to 12 hours after the specimen has been taken, provided that the specimen has been kept cool in the outer compartment of a domestic refrigerator (not frozen) - (stability "B" in table). Examples include the bacteriological examination of urine, and chemical estimations of the serum proteins, transaminases, and alkaline phosphatase.

Other specimens may remain stable for 24 hours at room temperature (stability "A" in table).

Any specimen which contains living cells should be sent promptly to the laboratory before any autolytic changes have occurred.

Blood specimens for haematological examination should be processed whenever possible within 12 hours after venepuncture. Serious errors in the platelet count, erythrocyte sedimentation rate and prothrombin time estimation etc. may otherwise occur and an opinion on the stained blood film may be impossible.

#### Transmission of specimens by post

The regulations in the "Post Office Guide" for the transmission of pathological specimens by post are, briefly, as follows:-

Pathological specimens may be sent by letter post, but not by parcel post, on condition that the specimen is (a) enclosed in a securely sealed receptacle which is itself contained in a strong wooden or metal case (or other case which has been approved by the Post Office) in such a way that it cannot shift about, and (b) surrounded by sufficient absorbent material to prevent any leakage should the inner receptacle be broken.

The packet must be conspicuously marked "Fragile with Care" and bear the words "Pathological Specimen".

Many specimens are not suitable for transmission by post, as excessive delay (which may amount to more than a day) will lead to decomposition and overgrowth of contaminating bacteria.

Suitable boxes may be obtained from the appropriate laboratories.

Transmission by Van Service

Where a van service is available for the transmission of specimens this should be employed in preference to the postal services. In all cases, specimens should be despatched to the laboratory as early in the day as possible.

For Urgent Investigations

When results of examinations are required urgently, the laboratory should be advised by telephone. Details of local arrangements for emergency work outside the usual laboratory hours will be found in the coloured sections.

INVESTIGATIONS AVAILABLE

The following investigations are available at the laboratories in the region:-

CLINICAL CHEMISTRY

This section applies to Edinburgh, Bangour and Peel, apart from minor amendments relating to Bangour (q.v.)

Types of Containers for Clinical Chemistry

W = White label

Plain glass, for chemical analyses requiring serum.

Y = Yellow label

Fluoride oxalate, for blood sugar determination.

ASSAYS ON BLOOD

<u>Estimation</u>	<u>Container</u>	<u>Normal Values</u>	<u>Stability</u>	<u>Vol. of Blood</u>
Bilirubin	W	less than 1.0 mg./100 ml.	A (Keep in dark)	3 ml.
Calcium	W	9.0-10.8 mg./100 ml.	A	5 ml.
Cholesterol	W	140-260 mg./100 ml.	A	3 ml.
Creatinine	W	0.6-1.2 mg./100 ml.	A	3 ml.
Electrolytes				
Potassium	W	3.8-5.2 m.eq./l.	C	} 6 ml.
Sodium	W	136-149 m.eq./l.	A	
Chlorides	W	100-107 m.eq./l.	A	
Glucose	Y	55-95 mg./100 ml. (fasting)	A	1 ml.
Phosphatase (acid)	W	1-3.5 K.A. units	C	3 ml.
Phosphatase (Alkaline)	W	3-12 K.A. units	B	3 ml.
Proteins (Total)	W	6-8 g./100 ml.	A	3 ml.
Proteins	W	Albumin 3.3-4.6 g./100 ml. a1 glob. 0.1-0.4 g./100 ml. a2 glob. 0.5-1.0 g./100 ml. β glob. 0.6-1.1 g./100 ml. γ glob. 0.6-1.2 g./100 ml.	B	3 ml.
Transaminases				
G.O.T.	W	Up to 40 units	B	3 ml.
G.P.T.	W	Up to 30 units	B	3 ml.
Thymol Turbidity	W	0 - 4 units	B	1 ml.
Urea	W	15 - 40 mg./100 ml.	A	3 ml.
Uric acid	W	less than 4 mg./100 ml.	A	3 ml.

Group AssaysTotal volume of  
blood requiredLiver Function Tests

(Serum bilirubin, Alkaline phosphatase, Thymol Turbidity)	B	5 ml.
Container W		

Electrolytes

(Sodium, Potassium, Chloride, Urea)	C	6 ml.
Container W		

Cerebrospinal fluids

By arrangement with the laboratory concerned.

Urine examinations

If assays are required on urine specimens, prior arrangements may be made with the laboratory.

Note: For details of stability see page 4.

BLOOD TRANSFUSIONBlood Grouping

Compatibility tests for transfusion of blood and supply of blood products.

Screening tests for antibodies (including detection of iso-immunisation in ante-natal or neo-natal patients).

Neo-natal serum bilirubin estimations.

Supply of plastic "recipient" sets.

Special facilities such as immuno-haematological investigations, analysis of abnormal haemoglobins and coagulation factor assays when necessary (see also Haematological Services).

Supply of Gamma Globulin

This should be obtained through Medical Officers of Health. Supplies can, however, be obtained directly from the Blood Transfusion Centre in cases of difficulty.

MICROBIOLOGYUrine

Microscopy, culture and sensitivity tests:

Microscopy, and culture for Myco. tuberculosis.

Throat and nose swabs

Microscopy for Vincent's organisms and yeasts.

Culture for common pathogenic organisms, i.e. haemolytic streptococci, staphylococci, pneumococci, yeasts and diphtheria bacilli.

Perinasal swabs or other special swabs for Bord. pertussis.

Sputum

Microscopy, culture and sensitivity tests.

Microscopy and culture for Myco. tuberculosis

Serous fluids (i.e. ascitic, synovial and pleural fluids)

Microscopy, culture and sensitivity tests.

Microscopy and culture for Myco. tuberculosis

Special arrangements can sometimes be made with the Pathology Departments for the examination of serous fluids for malignant cells but the laboratory should first be consulted.

Pus swabs and swabs from exudates.

Microscopy, culture and sensitivity tests.

Microscopy and culture for Myco. tuberculosis.

Blood culture

The laboratory should first be contacted and appropriate culture bottles will be made available. Sterile disposable syringes and needles are obtainable on bulk order from Executive Councils.

Conjunctival, Cervical and Urethral swabs

Microscopy and culture (especially for N. gonorrhoeae)

Swabs for Trichomonas vaginalis

Demonstration of motile trichomonads.

Cerebrospinal fluid

Cell count, culture and sensitivity tests.

Wassermann reaction.

Microscopy and culture for Myco. tuberculosis.

Colloidal gold test (Lange)

Nail clippings, scales, hairs, etc.

Microscopy and culture for pathogenic fungi and yeasts.

Faeces and Rectal swabs

Culture for pathogenic organisms, including salmonellae, shigellae, and enteropathogenic Esch. coli in young children.

Examinations for helminths and protozoa

Microscopy of faeces for cysts, ova, parasites, etc.

Identification of worms and segments passed.

Food poisoning investigations

Culture of suspected food materials in connection with food poisoning cases.

Culture of faeces for food poisoning organisms when specifically requested (heat-resistant Cl. welchii, Staph. aureus, etc.)

Microscopy and culture for yeasts and staphylococci following antibiotic therapy (when specially requested).

Perianal sellotape specimens

Microscopy for threadworm ova.

Serological tests

Widal test (using Salmonella antigens)

Widal test (using Brucella antigens)

Paul Bunnell test for Infectious Mononucleosis.

Serological tests for Syphilis (usually a screening test and others if clinically indicated).

Gonococcal complement fixation test.

Leptospiral agglutination tests (available in the Bacteriology Department, University of Edinburgh Medical School).

Special serological tests

Special serological tests such as the Rose-Waaler, and auto-antibody tests, and the Dye test for Toxoplasmosis. Viral complement fixation tests on paired sera with a 10-21 day interval between the 2 specimens.

When these investigations are desired, the local laboratory should first be contacted as the specimens may require to be sent to a reference laboratory.

Virus isolations from materials

The Regional Virus Laboratory (University of Edinburgh Medical School. Tel: Newington 1011, Ext. 2251) should be contacted.

HAEMATOLOGY

Routine blood counts.

Examination of a stained blood film.

Prothrombin time estimations.

L.E. cell tests	)	where mutually agreed between the general practitioner and the haematologist as a result of prior blood counts and blood film examination.
Serum B <sub>12</sub> estimations	)	

Certain examinations may be done only by special prior arrangement:-

- (1) Tests of haemostatic function (in conjunction with Blood Transfusion Service)
- (2) Red cell fragility determination
- (3) Radioactive isotope tests
- (4) Bone marrow examination

For routine blood counts and the examination of a stained blood film

Whole blood is required in a sequestrene tube. Sepcial 1 ml. tubes are available for "heel stab" specimens on infants. After filling, the tube should be gently inverted several times to dissolve the anticoagulant.

Full details of the patient's age, clinical condition and relevant therapy given (particularly haematinics) should be entered on the request form. In pregnancy the duration and gravidity should be stated.

MEDICO-LEGAL (PATERNITY) BLOOD GROUP STUDIES

Doctors are sometimes requested to co-operate in taking blood samples for blood grouping tests in connection with disputed paternity and similar cases. Co-operation in this connection does not come within the scope of the National Health Service, and such service should preferably be undertaken at the instance of solicitors representing the parties concerned. In these circumstances, arrangements can usually be made with Dr. F. S. Fiddes of the Forensic Medicine Department, Edinburgh University Medical School, (Tel: NEWington 1011, Ext. 2219), to have such samples examined for this purpose.

REGIONAL SERVICESPregnancy Diagnosis

Hormone Laboratory, Simpson Memorial Maternity Pavilion, Royal Infirmary of Edinburgh. Tel: FOUNTainbridge 2561.

Laboratory hours

Monday to Friday: 9 a.m. - 1 p.m.

2 p.m. - 5 p.m.

Saturday: 8.30 a.m. - 12.30 p.m.

There are at the present time two tests in routine use for pregnancy diagnosis:- the Hogben and an immunological test which is now largely replacing the Hogben for routine use.

The immunological test has an accuracy of approximately 98%. Both false positive and false negative reactions do occur. Most false positive reactions occur with urine from women at the menopause and may be avoided by a modification of the test if the age of the patient is given.

The Hogben Dilution test is still used for semi-quantitative estimation of chorionic gonadotrophin in cases where this type of test is indicated.

Specimens should be from first morning urine, at least 10 days after the last missed, but expected period. For the immunological test, about 10 ml. of urine are required in a clean bottle, which must be free of traces of disinfectant and detergents (a clean universal container is suitable).

If a Hogben test is required a similar 4 oz. specimen should be submitted.

Immunological tests are employed for routine purposes.

Request forms are obtainable from the laboratory.

Results are notified by post (or by telephone if requested) and it would be helpful if all confirmation slips were returned to the laboratory.

### Cervical Cytology

The examination of exfoliated cells from the uterine cervix is of value in detecting preclinical carcinoma of the cervix and there would be justification for general practitioners carrying out this test whenever the opportunity offers (i.e. at post-natal examination or on patients requesting it). It is not indicated in "suspicious" lesions of the cervix which should be referred to hospital for investigation.

#### Procedure

The cervix should be exposed with a speculum with good lighting. An Ayre spatula should be rotated in the cervical canal. The cells obtained should be smeared thinly on a clean microscope slide. This should not be allowed to dry but should be immersed in 95% alcohol for 15 minutes, following which it should be allowed to dry and labelled with the patient's name and despatched suitably packed, with a request form to the laboratory.

Examination of smears is carried out at the University Gynaecology Department, 39 Chalmers Street, Edinburgh, 3.

Supplies of Ayre spatulae, slides and request forms are obtainable from this laboratory.

### Virological Investigations

These are carried out in the Virology Department of the University of Edinburgh Medical School. A telephone call (NEWington 1011 Ext. 2251) to discuss the question of specimen collection and transport is welcomed by the staff and does much to increase the chances of obtaining positive results.

Specimens should always be accompanied by a brief clinical note which should at least indicate which system is involved, e.g. respiratory, cardiovascular, central nervous, gastro-intestinal, etc.





AREA A

City of Edinburgh, Midlothian, East Lothian  
and Northern parts of the Counties of Peebles and Berwick

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AREA AMicrobiological Investigations (except East Lothian)

University Department of Bacteriology (Lab. 4) Tel: NEWington 2542

Laboratory hours:

Monday to Friday:	9 a.m. to 5 p.m.
Saturday:	9 a.m. to 1 p.m.
Sunday:	10 a.m. to 11 a.m.

All specimens are received, however, till 9 p.m. each day.

Specimens sent after this hour are not normally dealt with until the following morning.

Telephoned reports

Reports of importance (e.g. isolation of salmonellae or shigellae from faecal specimens) will be telephoned as soon as a provisional report can reliably be given.

If a practitioner wishes a particular report to be telephoned as soon as possible, a note to this effect should be written on the request form.

Telephoned requests for results should be restricted to genuinely urgent situations.

Throat swabs

These will normally be examined for haemolytic streptococci and diphtheria bacilli. When culture for haemolytic streptococci only is desired, this should be stated on the request form in the space provided. When examination for Vincent's organisms or yeasts is requested this should clearly be stated so that special laboratory methods may be employed.

No local antiseptic or antibiotic should have been given previously, nor should the patient have had any hot drinks immediately beforehand. The swab should be rotated over the inflamed area, particularly in the tonsillar region, and any ulcerated or membranous lesion should receive special attention.

The diagnosis of diphtheria in the laboratory may take over 2 days, so treatment must not be delayed if this infection is suspected on clinical grounds.

#### Nasal swabs

These are usually examined for staphylococci and streptococci only. In the identification of staphylococcal carriers the swab should be rolled over the internal surface of both anterior nares. When diphtheria is suspected, this should be clearly stated on the request form.

#### Perinasal swabs for Bord. pertussis

These swabs are made from finely twisted wire and a small pledget of cotton wool, and are passed horizontally backwards through the nasal cavity. They are then rotated gently and withdrawn after about 30 seconds.

#### Sputum

Sputum may be examined for ordinary pathogenic bacteria (i.e. H. influenzae, Str. pneumoniae, etc.), Myco tuberculosis, or both (if this is specifically requested).

Results of cultures for Myco. tuberculosis are not usually available for 3 - 6 weeks, as the organisms only grow very slowly. Positive culture results are reported as early as possible and sensitivity tests against standard anti-tuberculous drugs are then carried out. The results of these tests should not be expected until an additional 6 weeks have elapsed.

Early morning sputum collected on rising is usually the best, and care should be taken to see that it is not contaminated by saliva or food materials. Sterile universal containers should be used.

#### Serous fluid and exudates

These will normally be cultured for general pathogens and direct films made and stained. Microscopy and culture for Myco. tuberculosis will be performed if specifically requested or if the laboratory findings are suggestive of tuberculous infection, and guinea pig inoculation will usually be carried out. In such cases as large an amount as possible should be sent.

In special cases these serous effusions, which should be sent quickly to the laboratory, may be examined for the presence of malignant cells. The fluid should be submitted in a sterile universal container, and a special note made on the request form. Such specimens will be referred to the University Department of Pathology where the cytological investigations will be performed, and it is always wise first to consult the laboratory when such examinations are considered. Delay in transmission may induce autolytic changes rendering cytological examination worthless.

Pus, Discharges and Exudates

In all instances (but particularly in actinomycosis and tuberculosis) a quantity of pus in a sterile universal container is preferable. In many cases, however, when the volume of pus is small or there is but little exudate, a swab may be satisfactory but a reasonable amount of the material must be submitted on it. Normally, microscopy, culture and sensitivity tests will be performed, but microscopy and culture for Myc. tuberculosis will only be carried out if specifically requested, or if a quantity of pus reveals no organisms on culture in a patient who has not received antibiotic therapy. For this reason it is particularly important to state if any previous antibiotic therapy has been given, and to indicate which drugs have been employed.

Conjunctival, Cervical and Urethral swabs

These will be examined by microscopy and culture for pathogenic organisms, but, if requested, microscopy and culture for N. gonorrhoeae may be carried out. It is important to state if this examination is requested as special staining and cultural methods are employed. If gonococci are to be cultured from such specimens only a minimum of delay is permissible.

Stuart's transport medium is available for these specimens. This medium prevents multiplication of contamination organisms while allowing continued viability of delicate pathogens such as gonococci and Trichomonas vaginalis. A special wooden swab is used to collect the exudate; it is then plunged into the bottle of Stuart's medium and the wooden swab stick broken off. The sealed bottle is then transported to the laboratory as quickly as possible.

Vaginal swabs

High vaginal swabs taken with the aid of a speculum may be cultured in an attempt to isolate gonococci but are less satisfactory than urethral and cervical swabs (see above). Where no mention is made of a "high" vaginal swab it will be assumed that the swab has been taken blindly by just inserting it into the vagina. In this instance, the results of any cultures are very difficult to assess.

Vaginal swabs for Trichomonas vaginalis and Candida albicans

When there is suspicion of vaginal trichomoniasis or thrush, bacteriological examination of the discharge is often useful. In the case of Trichomonas vaginalis infection Stuart's transport medium must be used (see above) and the specimen sent as quickly as possible to the laboratory, where it is examined microscopically for motile trichomonads.

If vaginal thrush is present a swab is taken by rolling the cotton-wool end over the lesion itself or collecting some of the discharge on to the swab. Ordinary swabs may be used for this, but, if there is doubt of the nature of the causative organism, a special swab in Stuart's medium should be used as it can be examined both for trichomonads and for yeasts.

### Cerebrospinal fluids

These should be sent to the laboratory without delay if delicate organisms such as meningococci are to be cultured.

Cell count, microscopy, culture and sensitivity tests will be performed, and a C.S.F. Wassermann Reaction carried out if requested. If any biochemical tests are required an appropriate specimen should be submitted to the Department of Clinical Chemistry.

### Specimens of scales, nail-clippings and hair

These will usually be examined by microscopy and culture for the presence of dermatophytes. Results of the microscopical examination will usually be available the following day but the results of culture for fungi may not be available for 3 - 6 weeks.

### Blood cultures

Suitable blood culture bottles will be supplied by the department on request. These will contain penicillinase and p-amino benzoic acid to counteract the effects of any penicillin or sulphonamides which may have been administered. Ideally, two bottles should be inoculated with 5 ml. each of blood and then gently agitated to aid dispersion and prevent clotting. They should be kept warm after inoculation and sent to the laboratory without delay. In the laboratory, subcultures are made at regular intervals until the original bottles have been incubated for 14 days.

Cultures for Brucella abortus are incubated for 4 weeks before being reported negative, and are made in special blood culture bottles ("Castaneda bottles") which will be supplied on request.

When it is not possible to take blood into a blood culture bottle it should be withdrawn aseptically and submitted in a plain sterile tube. Serum can then be separated and used for serological tests. (Widal tests, etc.) and the clot can be cultured. This is useful in cases of pyrexia of unknown origin due to infection by organisms of the salmonella (enteric) group.

### Technique for obtaining blood

Using a 10 ml. syringe, withdraw 9 - 10 ml. of blood from a convenient vein taking great care to sterilise the skin at the site of the puncture with tincture of iodine or 70% alcohol.

The plastic viscap is removed from each bottle by traction on the thread and the sterile metal cap is revealed underneath. Without removing the needle from the syringe the operator can inject 3 - 5 ml. of blood into each bottle through the rubber diaphragm in the screw-cap. The screw-caps must not be removed, nor should antiseptic be applied to them.

### Urine specimens

In both male and female patients, mid-stream urine specimens are preferable to catheter specimens owing to the risk of infection attendant upon catheterisation. Specimens are best taken early in the morning.

In the male, the prepuce is retracted and the glans washed, first with soap and water, then with mild antiseptic, such as 0.1% chlorhexidine. The mid-portion of the urine is collected in a sterile universal bottle, and sent in this to the laboratory.

In the case of the female, the patient sits on a low stool or lies in bed and cleanses the vulva with soap and water. The perineal area is then wiped dry, care being taken to avoid contamination with vaginal or rectal secretions by wiping from front to back. The mid-portion of the urine stream is collected in a sterile universal container and sent to the laboratory.

All urine specimens should be examined within 1 - 2 hours of collection unless they can be adequately refrigerated. This is because urine acts as a culture medium and slight contamination can develop into a heavy growth of bacteria if the urine is allowed to become stale through delay in transmission to the laboratory.

A limited supply of vacuum flasks containing a central sterile tube surrounded by cold antifreeze can be obtained on application to the University Bacteriology Department. These are useful when delay is expected in the transmission of a urine specimen to the laboratory but they are too fragile to be sent through the post. Quantitative bacteriological counts may be performed on these urine specimens which should, therefore, always reach the laboratory during normal working hours.

### Specimens of urine for tuberculosis investigations

When examination for Myco. tuberculosis is desired, the laboratory should be contacted and three large sterile bottles will be provided. The entire early morning urine specimen from the patient should be submitted on three consecutive days, each specimen being sent on the day it is passed. Microscopical examination will be performed and the results will usually be available within a day or two. Culture and guinea pig inoculation are also carried out, but the results of these tests are not usually available for at least 3 - 6 weeks.

### Specimens of faeces and rectal swabs

For the submission of samples of faeces a special container is provided. This is basically a universal container with a small wooden spoon within it for scooping up a small quantity of faecal material. In the collection of faecal samples great care should be taken to ensure that there is no contamination of the outside of the containers, and that the container is not filled to excess. The screw cap must always be tightly closed to prevent leakage of the contents. As an alternative to samples of faeces, a rectal swab may be examined. This should be taken by a responsible person and not by the patient himself, and the swab must always show faecal staining. In adults, cultures will be made for the common intestinal pathogens of the salmonella and shigella groups, but in children under about 3 years of age special cultural methods for the isolation of enteropathogenic Esch. coli will be used in addition. For this reason, and also to aid epidemiological reporting, the age of the patient should always be stated on the request form. Results on faecal samples are not available for at least 2 days, but provisional positive results will be communicated by telephone at the earliest opportunity (usually within 24 hours).

### Examinations for Helminths and Protozoa

Samples of faeces should be submitted in the usual faeces containers into which the material is introduced by means of the wooden spoon provided. When obvious segments of worms have been passed these should be submitted for identification. In order that motile vegetative amoebae may be seen in cases of suspected amoebic dysentery it is necessary to examine a selected part of the specimen (usually a portion of mucus) microscopically without delay. A large stool sample (for example, in a honey-jar) is required and this must be transmitted as quickly as possible to the laboratory.

### Perianal sellotape specimens

We recommend the following method of taking specimens for threadworm investigation as it gives more satisfactory results than does examination of rectal swabs or faeces.

A suitable length (i.e. 3") of cellophane tape should be pressed, sticky side on to the skin, round the anus; the tape is then removed and stuck firmly and smoothly on to a glass slide. The specimen should be procured as early in the morning as possible.

### Food poisoning investigations

When food poisoning is suspected it is most important to secure, if at all possible, any remainder of the food in question. This may be sent to the laboratory for isolation of organisms known to be associated with this condition. Cultural examination of faeces (and vomit, when available) is essential. It is important to summarise briefly on the request form the nature of the symptoms, the time delay after consumption of the food, and the number of cases involved. The appropriate Public Health Department should always be informed by telephone when food poisoning is suspected; the staff will give assistance in the epidemiological investigations and treatment if desired.

In addition to organisms of the salmonella group, others such as heat-resistant Clostridium welchii, and coagulase positive staphylococci may be isolated but such results must be interpreted with caution as these organisms can be isolated from the intestinal tracts of a substantial proportion of normal individuals. As the isolation of food poisoning organisms demands a number of additional laboratory procedures, the investigation of food poisoning must always be specified on the request form.

### Serological tests

**Specimens.** For all serological tests clotted blood is required and plain corked test-tubes ("Blood tubes") are provided in individual boxes. The outside of each box is clearly marked by a yellow disc.

**Widal test.** For this test a minimum amount of 3 - 5 ml. of clotted blood is needed. It is essential to enter full particulars on the request form and to list any prophylactic immunisation (i.e. with T.A.B.) which may have been given. The results of the test will normally be available within 2 days. Raised titres should be interpreted in consultation with a bacteriologist. (Clot culture is performed on all specimens of blood submitted for the Widal test, but positive results only are reported).

**Paul Bunnell test.** Minimum quantity of blood needed = 5 ml. A screening test using a slide method is first performed in the laboratory. If the sheep cells are agglutinated in this preliminary test the full test is then carried out. Normally the patient's serum is tested against sheep erythrocytes before absorption, after absorption with guinea pig kidney emulsion, and after absorption with ox red cell emulsion.

In a classical case of glandular fever, the antibody is absorbed by the cells but unaffected by guinea pig kidney emulsion. In cases of serum sickness and a typical glandular fever, and in a small proportion of normal persons, antibodies may be present which do not conform to this absorption pattern.

Serological tests for Syphilis. Minimum quantity of blood required = 5 ml.

All specimens submitted for serological tests for the diagnosis of syphilis are tested first by a screening test - the Syphilis Flocculation Reaction (S.F.R.). This is carried out in much the same way as a Kahn test. Specimens of serum submitted for routine purposes (i.e. during pregnancy or in a general investigation) are not normally examined further unless positive. If, however, previous tests have been reported as doubtful or positive, or, if the patient shows clinical evidence of syphilis (such as aortic incompetence, CNS lesions, etc.) this should be described on the request form, and further tests will be carried out.

The Wassermann reaction (W.R.) will then be performed and, if enough serum has been obtained, a Kahn Verification test will be carried out. The W.R. may detect a number of specimens of sera which fix complement when mixed with the Wassermann antigen and these "false positives" may be further investigated. Diseases known to cause such reactions include tuberculosis, glandular fever, malaria and certain other tropical diseases. "Collagen diseases" such as systemic lupus erythematosus may give similar results.

The Kahn Verification test has been designed to assess such reactions. It is simply the Kahn test performed at 0°C. and at 37°C. with different proportions of reagents. In a case of syphilis, the reaction is much stronger at 37°C., and the test is reported as "positive". When the reaction is stronger at 0°C., this is reported as a "General Biologic Reaction".

Despite the use of all three tests, some specimens of serum will yield inconclusive results and further tests such as the Reiter Complement Fixation (RCF) and Treponema Pallidum Immobilisation (TPI) tests may have to be carried out. Additional samples of clotted blood may, therefore, be requested by the laboratory in such instances.

#### Gonococcal Complement Fixation test

This test is of particular value in the diagnosis of chronic gonococcal infection such as arthritis, chronic salpingitis and other deeper infections. In acute gonorrhoea the test may not be positive when the patient presents with symptoms. Surveillance of patients with a history of exposure to infection should be undertaken, particularly if reassurance of freedom from infection is needed (see section on cultural diagnosis of gonococcal infection).

A few patients' sera have anticomplementary properties which are shown up by the controls made in all complement fixation tests. Such sera may require considerable laboratory work in assessing the anti-complementary activity and final reports may be delayed up to a week or more in such instances.

### Diagnosis of Leptospirosis

Only a small proportion of leptospiral infections result in classical Weil's disease (spirochaetal jaundice) and symptoms may simulate instead influenza, aseptic meningitis or non-paralytic poliomyelitis. They are usually characterised by some degree of meningeal, renal or hepatic involvement.

Leptospirosis should be considered in all cases of Pyrexia of Unknown Origin (P.U.O.) particularly if the patient is likely to have been exposed to infection through direct or indirect contact with animals. Rats, mice and other rodents, hedgehogs, pigs and dogs may carry leptospire in their kidneys and excrete them in the urine so that any occupation which brings a person into contact with soil or water contaminated with animal urine may bring about a leptospiral infection through skin abrasions or through the mucous membranes of the naso-pharynx. Agricultural workers, veterinary surgeons, abattoir workers, piggery workers, etc., are particularly exposed to the risk of infection. Canicola fever (L. canicola infection) sometimes results from contact with an infected pet dog. Swimming or accidental immersion in rivers and canals are also hazards.

The most satisfactory method of laboratory diagnosis is to isolate the causative organism from the patient (from blood or urine) and have it identified.

### Blood

Since leptospire can readily be cultured from the blood during the febrile stage of the illness a blood sample should be collected aseptically during the first week, before antibiotics have been administered. About 5 ml. whole blood is sufficient and a few drops of this are cultured in the laboratory. Serological examination is also carried out on this first specimen. Agglutinating antibodies are not likely to be detected at this early stage but a negative or low result is useful as a base line for subsequent tests which during the second and third weeks should show a steady rise in titre against one or more leptospiral serotypes if the patient is infected. Usually the identity of the infecting organism is revealed by the type that is agglutinated to the highest degree.

## Urine

From the second week onwards leptospirae may appear in the urine and continue to do so intermittently for up to 30 days. They do not survive long owing to the deleterious effect of an acid reaction and to antibodies in the urine. A specimen of midstream urine should be sent to the laboratory without delay for microscopic examination and if possible, isolation of the organism although this is not easy as the organisms are usually scanty and only intermittently present. Because of this a series of specimens is advocated.

## Diagnosis of Brucellosis

In this country brucellosis (undulant fever) is caused only by Br. abortus which infects cattle. Human beings derive the infection from drinking unpasteurised milk (even high grade "Certified" milk may contain live brucella organisms), or from contact with infected animals - farmers, veterinary surgeons, abattoir workers etc. are therefore liable to infection.

Although the disease may have an abrupt onset with chills and fever and be of short duration, it may also run an insidious and ill-defined course which if not diagnosed and treated may lead to chronic ill health.

Brucellosis should be considered in all cases of Pyrexia of Unknown Origin (P.U.O.) and in all undiagnosed illnesses with symptoms sometimes suggestive of "influenza". These may consist of nocturnal sweating, muscular and joint pains, severe and constant headache, pain at the back of the neck or severe backache in the lumbar region (brucellosis spondylitis is one of the complications which can occur). There may be enlargement of the liver, spleen and lymph nodes where the organisms tend to localise, mesenteric adenitis simulating acute appendicitis, nervousness with tremors of the hands and fingers, irritability and emotional instability and insomnia.

Every patient with any such symptoms who from epidemiological evidence is suspected of having brucellosis should have at least one blood culture performed and preferably several. The isolation of the organism gives a definite diagnosis of brucellosis. A blood culture bottle containing the appropriate medium will be supplied by the laboratory. 5 ml. of blood should be introduced into the bottle and at the same time 5 ml. taken for serological examination.

Serological tests usually consist of agglutination tests against standard suspensions of Brucella abortus and Br. melitensis. Although infection by Br. melitensis does not constitute a problem in this country it is usually included in the test in case the patient has been infected abroad. Since both species have antigens in common it is usual to obtain some degree of cross agglutination.

The Weybridge suspension of Brucella abortus is used for screening or confirmatory tests. It is highly specific, gives clearer and more easily read results but usually gives lower titres than the more sensitive Standard suspensions.

It is not always easy to interpret correctly the results of agglutination tests. Negative tests can occur where clinical and epidemiological evidence points to brucellosis. Low titres due either to residual antibodies from a previous infection or to "blocking factors" in active brucellosis may make one wary of making a definite diagnosis on the basis of agglutination tests alone. Repeated specimens may therefore be asked for in order that additional tests can be carried out to establish a diagnosis of active infection.

### Virological Investigations

Serological tests. In all serological tests for the diagnosis of viral or rickettsial infections, paired serum samples are necessary. The first should be taken as early as possible in the acute phase of the disease, and the second at least 10 - 14 days later during convalescence. In the case of lymphocytic choriomeningitis the second sample should be obtained at least 3 weeks after the first one.

Normally tests are NOT carried out on single sera because any one antibody titre may be accounted for by infection in the remote past. However, when specially indicated, single sera will be examined.

For these serological tests 5 - 10 ml. of clotted blood is required.

Respiratory Tract Viruses etc. At present sera can be examined as a routine in complement fixation tests with the following antigens:-

Influenza viruses A, B, C.

Parainfluenza 1, 2, & 3.

Sendai

Adenovirus group

Respiratory syncytial virus

Measles virus

Psittacosis group

Coxiella burnetii (Q fever)

Mycoplasma pneumoniae (Eatons Agent)

In addition, cold agglutination reactions and agglutination of Streptococcus M.G. are carried out.

Other antigens available are:-

Mumps, S & V

Herpes simplex virus

Lymphocytic choriomeningitis virus (L.C.M.)

Poliomyelitis types, 1, 2, & 3.

Estimation of antibodies to other viruses, e.g. ECHO & Coxsackie groups, requires multiple neutralisation tests which will be carried out when specially indicated.

N.B. No specific serological test is at present available for infective hepatitis.

Virus isolations

Respiratory tract viruses (e.g. influenza and parainfluenza viruses) are for the most part delicate and will survive outside the body for only an hour or two. For isolation saline garglings are collected and mixed with an equal volume of special virus transport medium. When gargling is impossible, as in young children, throat swabs can be used and give reasonably successful isolation results. The specimens must be transmitted to the laboratory IMMEDIATELY; if this is not possible the specimens must be kept as cold as possible, e.g. in the freezing coils of the refrigerator. For transport to the laboratory the specimens are packed in a salt ice mixture or solid CO<sub>2</sub>. Special containers for this purpose may be available from the laboratory.

N.B. Respiratory Syncytial Virus infections

Respiratory Syncytial Virus has been shown to cause a proportion of acute respiratory tract infections (particularly tracheo-bronchitis and bronchiolitis) in young children. This virus will not, however, survive freezing and immediate transfer of the specimen to the laboratory is necessary.

Aseptic Meningitis Viruses and some neurotropic viruses may be isolated from the cerebrospinal fluid and also from the faeces, e.g. ECHO, Coxsackie viruses, and herpes simplex and mumps viruses. The specimens should be kept as cold as possible and transmitted rapidly to the laboratory.

Enteroviruses, notably members of the ECHO and Coxsackie groups, can be isolated from the faeces in epidemic myalgia, aseptic meningitis, herpangina, respiratory illness, etc. etc. Poliomyelitis viruses may also be recovered from the faeces, especially soon after the administration of live oral vaccine. When possible, a sample of stool (about 5 grams) should be sent to the laboratory. No special precautions are needed as these viruses survive well.

Rectal swabs proved a reasonably satisfactory alternative for use in young children or in constipated cases; they must be well impregnated with faecal matter.

All attempts to isolate viruses from infected materials should be accompanied by a specimen of blood taken in the acute stage of the illness. If a virus is isolated, an attempt may be made to show the production of antibodies, and a second specimen of blood will be requested. Practitioners submitting specimens for virus isolation are reminded that, without serological evidence of infection, the isolation of a virus is not in itself proof of its role as the causative organism.

Psittacosis, inclusion blenorrhoea, trachoma and rickettsial infections.

Exudates, conjunctival scrapings etc. etc. should NOT be placed in the standard virus transport medium which contains antibiotics lethal to these infective agents. Special containers of skim milk medium are supplied for this purpose.

EAST LOTHIANMicrobiological Investigations

East Fortune Hospital Laboratory, Esat Fortune. Tel: Athelstaneford 244.

Central Microbiological Laboratories, Western General Hospital,  
Edinburgh, 4. Tel: DEAn 1311, Ext. 179.

Enteric and Public Health Laboratory	Ext. 165
Chemotherapy	164
Tuberculosis	171
Immunology	162
Director	170

Laboratory hours are 8.30 a.m. - 5. 30 p.m. Monday to Friday.  
Urgen specimens can be received at the laboratory from 9 a.m. - 12 noon  
on Saturday morning; at other times the bacteriologist at the Central  
Laboratories may be contacted.

Reports

It is exceptional for valid results to be available in less than  
24 hours. Exceptions might be the result of direct microscopy or a  
cerebro-spinal fluid which, like other urgent reports, would be  
telephoned as soon as possible to the practitioner. Otherwise written  
reports will be despatched by van to the various collecting points and  
where this is not feasible, by post.

Telephoned requests for results should be restricted to genuinely  
urgent enquiries or cases of doubt.

The primary function of the laboratories is microbiological and  
immunological diagnosis. The examination of body fluids for tissue  
cells and chemical constitutents is not normally undertaken.

Initial reports concentrate on identification of the main group of  
micro-organisms present, their probable significance and if appropriate,  
their antibiotic sensitivity. When further information of clinical  
usefulness is obtained on subsequent study, it will be sent in follow-up  
reports. If more information is required then enquiry should be made  
of the Microbiologist.

In other instances it should always be remembered that most of the  
body surfaces are heavily colonised by commensal microbial flora, and  
this will inevitably contaminate material sent for examination, and as  
far as possible it will be taken into account by the Microbiologist.

All specimens submitted to the laboratory should be accompanied by an East Lothian Hospital Microbiological request form (yellow headings).

Where possible, first specimens should be submitted before chemotherapy has begun. All specimens submitted will be examined as fully as seems necessary by the Bacteriologist; to this end any relevant clinical information is helpful and should be included; of particular importance is a note on current chemotherapy and any particular antibiotics which may be contemplated for treatment.

### Specimen containers

All specimens must be submitted in sterile containers issued by the laboratory. These will be available at the collecting points and any difficulties in supply should be notified to East Fortune laboratory. There are some containers of a more specialised nature which will be retained in the laboratory for issue on demand only. The containers available at the pick-up point are as follows:

Universal screw capped 1 oz. containers for the collection of specimens such as urine, sputum and pus, and blood.

Universal containers plus a small wooden spoon for the collection of faeces.

Blood tubes which are 5" x  $\frac{1}{2}$ " stoppered test-tubes for the collection of clotted blood and cerebro-spinal fluids, etc.

Cotton wool swabs in 5" test tubes for swabbing wounds and surfaces etc.

The following containers are available in restricted quantity or on request from the laboratory:

Fine pernasal swabs

Laryngeal swabs

20 oz. screw-capped bottles for the collection of large quantities of fluid, e.g. early morning specimens of urine or pleural fluid.

$\frac{1}{4}$  oz. screw-capped bottled (Bijou bottles) containing medium for the collection of vaginal exudate.

1 oz. screw-capped bottles containing solid medium for eye exudates.

Blood culture bottles. These are 4 oz flat bottles containing 50 ml. of broth. If required penicillinase-containing bottles can be provided.

On request petri dishes containing special media for the isolation of *N. gonorrhoeae* will be provided.

#### Throat swabs

Whether actual clinical infection or merely screening for carriage of pathogens or clearance after treatment should be noted on the request form.

These are examined for the most likely pathogens but normally this does not include the Diphtheria bacillus: if there is any real suspicion of clinical diphtheria a special note to this effect should be made. If Vincent's infection is suspected an additional swab should be taken or, preferably, a film made on microscope slide directly from the throat or alveolar exudate, and sent to the laboratory. (See note on Preparations on glass slide page 32).

Taking of the swab: The swab should be rotated firmly over the inflamed area and any exudate or membranous material specially sampled.

#### Nose swabs

Those taken for staphylococcal carriage should sample the anterior nares; those taken for upper respiratory tract infection should sample deeper into the nasal cavity.

#### Pernasal swabs

These are very fine swabs which are passed backwards through the nasal cavity into the naso-pharynx where they are rotated gently and withdrawn. This procedure is especially suitable for *Haemophilus* and *Bordetella pertussis* isolations.

#### Sputum

Normally this will be examined for the presence of potential pathogens such as the *Pneumococcus*. If tuberculosis is suspected this should be specifically noted on the request. Microscopic examination will then be reported in a short time but the results of culture may take up to twelve weeks.

#### Exudates

When possible, fluid or exudate should be sent to the laboratory in a tube or Universal container. If this is not possible a swab must be inoculated as heavily as possible and sent to the laboratory. It is

important to describe fully the source of the exudate so as to direct the best line of laboratory examination.

Exudates are normally examined for a wide range of aerobic and anaerobic pathogens but not mycobacteria unless the laboratory findings are suggestive of such infection; thus a note of clinical tuberculosis is helpful on the appropriate occasion.

### Conjunctival infections

The most satisfactory method of examination is the direct inoculation of the exudate from the eye on to culture medium and small screw-capped bottles containing chocolate agar are supplied on request. Simultaneously a smear of the exudate should be made directly on a microscope slide and sent to the laboratory.

Alternatively, swabs may be sent.

### Cervical and urethral exudates

If gonococcal infection is suspected the bacteriologist should be consulted at once.

In the male, urethral exudate may be used to make direct slide smears and to inoculate media directly. These media must be freshly supplied from the laboratory. Alternatively swabs of various kinds such as charcoal swabs, may be used.

Diagnosis is much more difficult in the female: urethral or Bartholin's gland exudate may be submitted. Cervical exudate must be obtained under direct vision from the cervical canal to reduce the amount of contamination with vaginal flora; these exudates are examined as for the male.

### Vaginal exudates

These are examined most commonly for Trichomonads, Monilia and abnormal bacterial flora.

For Trichomonas vaginalis the exudate should be transferred directly to culture medium as supplied in small screw-capped bottles for transfer to the laboratory. Alternatively exudate may be sent in saline or transport medium for direct immediate examination, or a smear made on a microscope slide for staining in the laboratory. The latter method is the least satisfactory for Trichomonads, but is more useful for the detection of Moniliasis.

Preparations on glass slides

Direct microscopic films and material such as skin scales are best submitted to the laboratory on microscope slides. The preparation on one slide may then be covered by a second slide and a strip of Sellotape wound around to secure the preparation.

Vaginal swabs should be plentifully loaded with exudate or the results of bacteriological examination will be unreliable.

In cases of suspected uterine infection, e.g. post-partum, high vaginal swabs should be taken, preferably under direct vision to avoid contamination.

Cerebro-spinal fluids

It is most important that these be examined fresh as cells and micro-organisms deteriorate rapidly if the fluid is left standing. If meningitis is suspected, a cell count will be carried out with microscopy on the centrifuged deposit followed by culture. Normally culture is not carried out on fluids showing no increase in cell count, and it is pointed out that there is little good in culturing fluids from cases which are known to be suffering from non-infective disease of the central nervous system.

Examination for epidermophytes

Skin scales, nail clippings and hair are best submitted in a container or between two microscope slides, for microscopic examination; this method gives unequivocal positive results, although a negative result is less conclusive. Culture is only worth while in special cases or for epidemiological purposes.

Blood culture

This should be carried out in any case of pyrexia where the diagnosis is in doubt, or in conditions where bacteraemia is known to be diagnostic, e.g. Salmonella disease. 5 - 10 ml. of venous blood should be inoculated into blood culture bottles containing sterile fluid medium which are issued from the laboratory. Several bottles may be used at one time to increase the chances of isolation. The clot should be dispersed by gentle agitation and the culture bottles sent to the laboratory immediately. One of the chief drawbacks is the presence of antibiotic in the blood and this can only be successfully counteracted in the case of penicillin, so that when it is known that penicillin is being used, blood culture bottles containing penicillinase should be inoculated. There is no particular advantage in inoculating special types of media.

### Urine specimens

Urine from the bladder will contain micro-organisms if there is active infective disease of the renal tract; in most such cases the number of bacteria is at least 100,000/ml. Unfortunately urine collected per urethram is always contaminated with commensal flora from the terminal urethra, skin of the perineum and from the anus and vagina. The degree of contamination varies with the manner of sampling, being generally least in the circumcized male and greatest in the female with vaginal infection. The bacteriologist tries to distinguish between these commensals and organisms which may indicate infection of the renal tract. Further it should be remembered that prostatitis and urethritis may also contribute organisms to the urine.

Both quantitative and qualitative relationships of the micro-organisms present in the urine are important, and these relationships are best preserved in short transit times and storage at low temperature. Transit times in excess of four hours must be avoided unless storage at lower than 10°C. can be maintained. (see use of vacuum jars page 34.)

Bacteruria may be accompanied by pyuria but not necessarily so. Similarly pyuria may exist without apparent bacteruria in which case special investigations for Myco tuberculosis must be made and in special cases virus infections may be responsible. Examination for inflammatory cells in the urine is only successful if a fresh specimen is available since the cells lyse and a false result may be obtained when older specimens are examined. Thus wherever possible microscopic examination should be carried out in the side-room and requests for laboratory examinations of this type restricted to particular cases.

Sampling of urine is best carried out with the minimum of preparation; the stream of urine should be directed straight from the urethra into the sterile bacteriological container and on no account should antiseptics be used in collection. It is obvious that the most successful sampling will be possible only with patients who are able to co-operate and contamination is inevitable in bed-ridden females. Diagnosis in such cases may be very difficult.

Urine samples are examined in the laboratory by a semi-quantitative technique and the results are reported to the nearest order of ten. If antibacterial activity is present in the urine, as a result of chemotherapy or otherwise, then the significance of the result may be affected.

### Specimens of urine for tuberculosis examination

When tuberculosis is suspected a minimum of 3 early morning specimens should be collected on three separate occasions in 20 oz. screw-capped sterile bottles which can be provided on request.

### Use of vacuum jars for transport of specimens

Vacuum jars may be cooled, preferably by placing a capsule of material previously deep-frozen in the cavity of the jar. The temperature will thus remain below 10°C. for 12 hours or more and bacteriological specimens may be transported inside the jar thus avoiding multiplication of bacteria. This is particularly suitable for urine specimens. It is hoped that a series of these jars may be available to circulate with the vans and relevant specimens placed in them for transport to the laboratory.

### Specimens of faeces and rectal swabs

Wherever possible, faeces should be submitted in preference to a rectal swab. In the collection of faecal samples the greatest care must be taken to avoid contamination of the outside of the containers and the caps of the Universal containers must be tightly closed to prevent leakage.

The specimens submitted will normally be examined for the common bacterial pathogens, Shigella, Salmonella, and type-specific Esch.coli. If the patient under examination has a history of being in the tropics, or there are any particular individual or family circumstances of epidemiological importance, these should be noted, as they are essential to allow the microbiologist to direct his lines of enquiry.

Other points relating to intestinal infections and the investigation of food poisoning may be found in the other sections.

### Serological examinations

Clotted blood (or separated serum) should be submitted for all such tests. Preferably 10 ml. of blood should be withdrawn and put into a Universal container or sterile "blood tube" (5" x  $\frac{1}{2}$ " test tube provided with a cork). This enables multiple tests to be carried out and allows storage of a sample which may be convenient for later comparison.

A wide range of tests is carried out at the Central Laboratories and sera submitted for examination to East Fortune are automatically referred there. In the diagnosis of some patients, particularly those with pyrexia of unknown origin, many tests require to be done and where possible any specific indication of which particular one is thought to be most relevant is helpful.

The majority of results are reported as a titre which is the reciprocal of the dilution of the patient's serum producing the measured laboratory effect, e.g. agglutination (Widal test), complement fixation (as in many virological tests) and inhibition of haemolysis (antistreptolysin test) etc. Such figures by themselves may mean little, and require interpretation in the light of a clinical background; the bacteriologist may be able to help in this interpretation if he has the available information.

Frequently the result of examination of a single, isolated specimen of serum is of little value, since it is not referable to a previous result for the individual patient, and the "normal range" of antibody values is so wide. For this reason it is a general rule that at least two specimens be examined, at an interval of no less than five days (this minimum interval may be longer, particularly in virus infections) so that any rise or fall in antibody may be measured. In all cases the results of immunological tests must be carefully considered in relation to the patient's occupation, history and clinical findings, and particularly to previous artificial immunisation and residence in areas where particular infectious diseases may be endemic.

Some of the chief types of immunological test are listed below, accompanied by a figure which may be taken as a guide to the upper limit of normal. Values in excess of these can be regarded as suggestive of past or current disease. In most cases, unless otherwise stated, the values are the titre of the serum which is the reciprocal of the highest dilution of the serum showing a positive result.

Salmonella agglutinin (Widal test)	very variable	120
Brucella agglutinin		60
Pastuerella agglutinin		10
Cold agglutinins		20
Streptococcus M.G.		20
Paul-Bunnell		40
Anti-streptolysin 'O'		125 Todd units/ml.
Anti-alpha staphylolysin		0.5 units/ml.
Rose Waaler		64
Toxoplasma (dye test)		8

### Diagnosis of Brucellosis and Leptospirosis

When these diseases are suspected the bacteriologist should be consulted at once. Their laboratory diagnosis is discussed on pages 23 and 24.

### Chemotherapy

It is common to ask for antibiotic sensitivity when submitting specimens for bacteriological examination. In many cases the organism isolated belongs to a group of bacteria which are known to have a fixed

susceptibility to the antibiotics usually used in treatment, and therefore no good purpose is served by carrying out tests on individual strains. To assist the practitioner the most frequently occurring constant patterns of susceptibility to antibiotics (antibiogram) are listed below and the drugs given are those to which the organism is regarded as being sensitive for therapeutic purposes. The actual choice for clinical use is left to the clinician.

There are a number of organisms which vary in their susceptibility to antibiotics and these are tested individually. Further, there are a limited number of patients in whom bacteriological diagnosis may be difficult or in whom the infection is complex and these will require further laboratory tests. The laboratory is always pleased to give assistance in such cases to the best of its ability and appreciates consultation when results of treatment appear to contradict its initial opinions.

A wide range of antibiotics is used in sensitivity tests when they are carried out if any particular antibiotic is being used or is contemplated for use, note should be made on the request form.

In the case of urines, the report may contain the statement "sensitive to all the usually used antibacterial agents", and this may be taken to mean the battery of agents incorporated in our tests, which currently includes the penicillins (ampicillin, and cephaloridine) the amino-glycosides (streptomycin and Kanamycin), the tetracyclines, chloramphenicol, cycloserine and the sulphonamides.

COMMON ANTIBIOGRAMS

Bacterial group	Most usually sensitive to	Individual strains show variable sensitivity to
ACTINOMYCES	P S C T	
<u>BACILLUS anthracis</u>	P C T	
BRUCELLA	S C T E	
BACTEROIDES	C T	
CLOSTRIDIA	A C T	P S Su
CORYNEBACTERIA	P E	
<u>NEISSERIA gonorrhoeae</u>	S K C T	P Su
<u>NEISSERIA meningitidis</u>	Su P C E	
HAEMOPHILUS <u>including H. influenzae</u>	S C T A	P E
LEPTOSPIRA	P S T	
PASTEURELLA	S C	
PNEUMOCOCCUS	P A E C	
PROTEUS <u>usually P. mirabilis</u>	A Su C K	
<u>PSEUDOMONAS pyocyanea</u>	Py	Su S C T K
SALMONELLA	C A	S Su Neo Py
SHIGELLA		Su S C T Neo Py
STAPHYLOCOCCUS reported antibiotic sensitive	P C T E M	
Antibiotic sensitive but producing penicillinase	C M E T L	P
Antibiotic resistant	C M	L E
<u>STREPTOCOCCUS pyogenes</u>	P E C	T
other streptococci	E	P C T

Bacterial group	Most usual sensitive to		Individual strains show variable sensitivity to
<u>ESCHERICHIA coli</u> "antibiotic sensitive"	A S C T K Cy Su		
"Antibiotic resistant"			Variable
coliforms includes Klebsiella, Paracolon, Providencia.	A S C K		
P benzyl penicillin	Su	sulphonamide	
S streptomycin	K	kanamycin	
C chloramphenicol	A	ampicillin	
T tetracycline group	Py	polymyxins (and colomycin)	
E erythromycin	M	penicillinase-resistant penicillins (methicillin, oxacillin, cephaloridine and fucidic acid)	
L Lincomycin	Neo	neomycin and framycetin	

Clinical Chemistry Investigations

University Department of Clinical Chemistry, Royal Infirmary of Edinburgh.  
Tel: FOUNTAINbridge 2477 Ext. 316

See General Section for details of collection, normal ranges etc.

Laboratory Hours

Normal Service Monday to Friday 9 a.m. - 5.15 p.m.

Limited Service Saturday 9 a.m. - 12.30 p.m.

Sunday 10 a.m. - 1 p.m.

In addition, the laboratory is staffed for the reception of specimens until 10 p.m. on Monday to Friday and until 4 p.m. on Saturday.

Consultations and Emergency Work. A biochemist is available in the Department during the hours of normal service and is obtainable at all other times through the telephonist at the Royal Infirmary.

Routine Urine Tests and Tests for Blood in Faeces. These tests can satisfactorily be carried out in the surgery by using tablets or "stix" as supplied by Messrs. Ames & Co., and requests should not normally be sent to the Laboratory.

Suggested Handbooks. The Department publishes a loose-leaf Handbook which is primarily produced for the use of Hospital Staff, but any General Medical Practitioner who wishes to receive a copy may make application to the Departmental Secretary.

The following booklet may also be found helpful:-

Biochemical Values in Clinical Medicine.

R.D. Eastham.

Published by John Wright & Sons Ltd.

## Blood Transfusion Service

Regional Blood Transfusion Centre, Royal Infirmary of Edinburgh.

Tel:                      Laboratory:              FOuntainbridge 7291 (ask for service required)

Director:                FOuntainbridge 5255

The laboratory is open and staffed at all times.

Emergency requirements should be marked as such on the request form and if a telephoned report is desired this also should be stated. In very urgent cases it is advisable to contact the laboratory by telephone to ensure that the degree of urgency is clearly understood and the request given the necessary priority.

### Specimens

Almost all examinations in blood group serology require a clotted sample. For full blood group and antibody screening at least 4 mls. of blood is necessary (this quantity also provides for limited antibody identification tests when a positive result is obtained at initial screening).

### Containers

Labelled specimen tubes are supplied in boxes, including request forms and a prepaid addressed label for return postage.

Normally these are supplied on a one for one exchange basis but additional quantities are obtainable on request.

### Request form

1. History. The relevant points in the history are indicated in the request form and previous clinical or serological evidence of haemolytic disease of the newborn should always be stated. The information is important since it may influence the type of test required.

2. Identification. Each patient is given a laboratory reference number and it is of great help to quote this in any subsequent request, as it facilitates tracing the previous record.

### Ante-natal screening

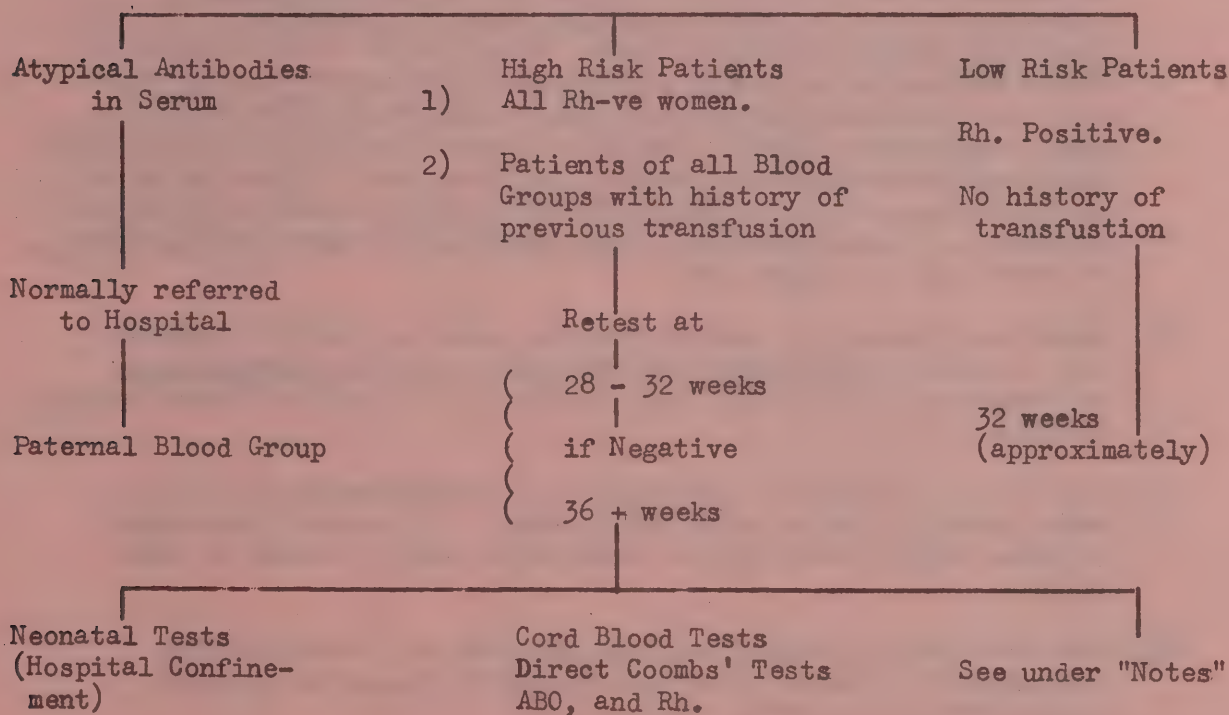
A basic "screening" chart is given and the following notes are intended to amplify some of the more important points.

Where systematic screening is carried out in successive pregnancies a certain amount of sample taking can be eliminated by taking advantage of the available knowledge of haemolytic disease of the newborn and of the relative risk in different categories of patients. Alternatively it may be found more convenient to adopt a "rule of thumb" system giving maximum protection. The information given below gives some guidance in deciding which method suits individual practitioner.

### Ante-Natal Screening

#### Sample at First Attendance

Assessed on basis of blood group serology and clinical History



More detailed information is contained in the leaflet on the Rhesus Factor and Haemolytic Disease of the Newborn issued by the Scottish National Blood Transfusion Association and obtainable through the Regional Blood Transfusion Service.

## Notes

- (a) Every sample is examined for ABO and Rh-type and for the presence of atypical antibodies likely to be associated with haemolytic disease of the newborn or complicating the transfusion of blood.
- (b) When atypical antibodies are found for the first time the information is telephoned and on final identification, the report, together with a personal record card is sent by post. The card is self explanatory and it is important to ensure that the patient carries it with her and obtains a replacement when necessary.
- (c) Haemolytic disease of the newborn can be related to blood group systems other than Rhesus (including ABO). Immunisation is relatively common in Rhesus positive women who have been previously transfused and in these circumstances often results in the production of antibodies to unusual blood group factors which may create serious difficulty in the provision of blood for both mother and child. Prior knowledge of possible difficulty obtained by systematic ante-natal screening is therefore of great value in the management of both mother and child and the Transfusion Service maintains a special panel of blood donors of uncommon blood groups to cover such contingencies.
- (d) Haemolytic disease of the newborn can occur in apparently first-born children, particularly if the mother has had a transfusion. Any pregnancy lasting more than 6 weeks is a potential immunological stimulus.
- (e) Most cases of "primary" sensitisation are detectable by 28 - 32 weeks gestation and usually before this. In a small proportion of cases however they are not detectable until 36 weeks or even later.
- (f) When the antibody screen has been negative at 36 weeks and an unaffected baby born, it is unnecessary to retest in the next pregnancy till mid term.
- (g) Determination of the blood groups of husbands is essential only when atypical antibodies have been detected in the maternal serum. Some practitioners may however prefer to know the blood groups of husbands of "high risk" patients, for example those who are Rh negative. If transfusion is suspected as a cause of iso-immunisation determination of the paternal blood group is of great importance since the offending antigen may be absent.
- (h) Tests are necessary in each pregnancy

Neo-natal investigations

1. Cord blood may be sent routinely from all babies if desired, or on a priority basis - i.e. "high risk" patients only (see chart).
2. Samples of cord blood from neonates are examined routinely for ABO and Rh-type and by direct Coombs' test.

If serum bilirubin is required in addition, at least 1 ml. of clotted blood is necessary.

3. Irrespective of previous laboratory reports, clinical evidence at birth or later suggestive of haemolytic disease of the newborn, should be regarded as an indication for samples of both foetal and maternal blood being sent for examination as "very urgent".
4. If cord blood is no longer available a few drops taken by heel stab are sufficient for direct Coombs' test and blood group. It is of the utmost importance to send a sample of maternal blood as well as that from the baby in these "suspect" cases as it is from the former that the identity of the antibody is most likely to be determined and the compatibility test, when necessary, carried out.

Haematology

Department of Haematology, Royal Infirmary of Edinburgh.  
Tel: FOUntainbridge 2477 Ext. 241

Laboratory hours

Monday to Friday: 9 a.m. to 5 p.m.

Saturday: 9 a.m. to 1 p.m.

To ensure examination being made on the same day specimens should reach the laboratory by 4 p.m. on a week day or 12 noon on Saturday,

The laboratory is open only for genuine emergencies on Saturday 2 p.m. - 4 p.m. and on Sunday 10 a.m. - 1 p.m. and requests must be previously agreed by telephone and arrive at least one hour before the laboratory closes. Outside these hours the haematologist on call should be consulted; his telephone number can be obtained from the Royal Infirmary telephone operator.

Collection of specimens is carried out by the laboratory van service according to the schedule. Specimens can be left at collecting points, delivered to the laboratory or left at the Head Porter's office (after 5 p.m. at the West Gate), Royal Infirmary. Care should be taken when leaving a specimen at a collection point to ensure that it will reach the laboratory in time.

The 2.5 ml. sequestrene containers for blood counts are available complete with request form and self-sealing envelope from collecting points marked "D" on van schedule or from Head Porter's Office, Royal Infirmary. Containers required for other tests can be obtained direct from the laboratory.

Request forms are on N.C.R. (no carbon required) paper. Care should be taken not to separate the leaves of the form which is "self-folding" along the middle line. They should not be folded other than at this line so as to avoid smudging the copy.

Details must be completed using a ball-point pen. Tests requested should be indicated by "ticking" in the relevant box. Hb, P.C.V., E.S.R. and W.B.C. (which are differentiated by green "boxes") constitute the normal "Screening" tests on new patients and will be carried out if no individual tests are indicated (the P.C.V. only being done if Hb is outside normal limits); they should not, however, be requested routinely (in pregnancy for instance the W.B.C. and E.S.R. do not carry their normal significance).

Patient's name etc. should be written on the detachable label at the top of the form and affixed round the specimen tube.

A blood film on a new patient will be inspected without prior request if the Hb is abnormal or if it is otherwise indicated by the clinical details given on the form or as a result of other tests done at the time by the laboratory. A differential white cell count will be done automatically when the total W.B.C. count is outside normal limits (except in pregnancy).

One ml. sequestrene tubes for specimens from infants can be obtained from the laboratory.

The Prothrombin time is estimated on a blood specimen in a special tube (with a white label). The tube should be filled exactly to the mark and gently mixed immediately after the blood is added. It is important that it is processed within 12 hours of collection.

A Serum B.12 estimation can be carried out on a specimen collected in a sterile universal container - obtainable from the laboratory. The specimen should be collected aseptically and the patient should have had neither antibiotics nor sulpha drugs during the previous three days nor have been given vitamin B.12 during the past three months. 20 ml. of clotted blood is required for the test. Prior agreement with the laboratory is needed before the test is submitted.

L.E. cells - Blood for L.E. cell test (at least 8 ml.) should be collected in a special sterile universal container containing glass beads, which can be obtained direct from the laboratory. The blood must be defibrinated by continuous gentle rotation of the container for a minimum of ten minutes immediately after collection of the blood sample and the specimen should reach the laboratory within 2 hours of venepuncture and before noon. This test is only done on weekdays and prior agreement with the laboratory is required.

"Restricted Tests" as indicated on the request form should only be requested after consultation and agreement with the haematologist. Arrangements can be made with the laboratory to have marrow films obtained and examined on an out-patient basis.

Reports are despatched whenever possible by post on the same day as the request is received. Markedly abnormal results are phoned immediately direct to the telephone number given by the practitioner on the request form.

The consultant haematologist is available for consultation at the laboratory (preferably by prior appointment) or by telephone.

Venepuncture

Venepuncture service for General Practitioners' Out-Patients will be available from January 1967. Out-Patients should attend the Haematology Laboratory, Royal Infirmary of Edinburgh, during laboratory hours and bring with them a haematology request form appropriately completed for a venepuncture.

Post Mortem Examinations

Practitioners requiring an autopsy should contact the Department of Pathology, University of Edinburgh Medical School, Teviot Place, Edinburgh, (Tel: NEWington 1011 Ext. 2272) where the member of staff responsible for the conduct of the autopsy service will be available to discuss the case briefly. This is necessary because some measure of selection has to be applied even to hospital autopsies, at the present time, due to the large routine work load which they constitute. In general, however, it may be assumed that every possible assistance will be given to a general practitioner in this matter. Arrangements for the transport of the body from the home to the autopsy room and back should be made with the undertaker employed by the relatives. A separate account for this additional service should be submitted to the Regional Board. Written permission for Post Mortem must be delivered to the Pathologist before any autopsy is commenced.

CITY OF EDINBURGH AND MIDLOTHIAN AREASLABORATORY VAN SERVICESNOTES

1. Specimens must be clearly labelled with destination - i.e.

University Gynaecology Department.

Hormone Laboratory, Simpson Memorial Maternity Pavilion, Edinburgh, 3.

2. Edinburgh Area - to ensure delivery to the laboratory on the same day, specimens must be sent by the mid-afternoon collection at the latest, with the exception of Saturday, when bacteriological specimens on the afternoon collection will reach the University laboratory the same afternoon.

TYPES OF CONTAINERSCLINICAL CHEMISTRY

(see table in general section).

MICROBIOLOGY

Universal containers (marked on the outside with a yellow disc).

Stool containers

Swab sets

Corked blood tubes (marked on the outside with a yellow disc).

Arrangements are made to issue containers and forms from the distribution and collecting stations marked (with a "D") in the van service section.

Large orders for containers and forms will still be accepted (by telephone, if desired) at the Bacteriology Department and may be transported by van to the distribution centres to await collection there. Practitioners wishing this to be done should so indicate when requesting supplies and should name the nearest or most convenient centre.

Other special containers or kits may be obtained from the Department by prior arrangement (i.e. blood culture and early morning urine bottles, viral or Stuart's transport media, pernasal swabs, etc.).

Orders to country areas will normally be despatched by post.

HAEMATOLOGY

Sequestrene tubes are obtainable from van collecting stations labelled "D" in the schedule. Other containers such as small 1 ml. tubes for infants, prothrombin tubes, universal containers with glass beads may be obtained from the laboratory.

BLOOD TRANSFUSION

Labelled specimen tubes are supplied in boxes, including request forms and a prepaid addressed label for return postage.

Normally these are available on a one for one exchange basis, but additional quantities are obtainable, on request from the laboratory.



CITY OF EDINBURGH AREAROUTE SCHEDULE FOR LABORATORY VAN SERVICE

<u>SOUTH VAN</u>	<u>Round 1.</u>	<u>Round 2.</u>	<u>Round 3.</u>	<u>Round 4.</u>
Leave Western General	8.43 a.m.	-	-	-
" Liberton Hospital	9.15 a.m.	-	1.16 p.m.	-
" Southfield	9.23 a.m.	-	1.24 p.m.	-
" P.M.R. Hospital	9.36 a.m.	-	1.38 p.m.	-
" City Hospital - D	9.56 a.m.	11.18 a.m.	1.58 p.m.	3.08 p.m.
" Craighouse	10.00 a.m.	-	2.00 p.m.	-
" West House	10.08 a.m.	11.30 a.m.	2.10 p.m.	3.20 p.m.
" Astley Ainslie	10.20 a.m.	11.42 a.m.	2.22 p.m.	3.32 p.m.
" R.H.S.C.	10.23 a.m.	-	2.25 p.m.	-
Arrive Royal Infirmary	-	11.49 a.m.	-	3.39 p.m.
" Medical Buildings	10.30 a.m.	11.57 a.m.	2.32 p.m.	3.47 p.m.
Leave Chalmers Street	11.05 a.m.	-	3.05 p.m.	-
Arrive Western General	-	-	-	4.26 p.m.
<u>CENTRAL VAN</u>	<u>Round 1.</u>	<u>Round 2.</u>	<u>Round 3.</u>	<u>Round 4.</u>
Leave Western General	8.53 a.m.	-	-	-
" Chalmers Annexe	-	11.12 a.m.	-	3.07 p.m.
" Chalmers Hospital	9.15 a.m.	11.18 a.m.	1.18 p.m.	3.13 p.m.
" Bruntsfield	9.27 a.m.	11.28 a.m.	1.30 p.m.	3.23 p.m.
" R.H.S.C.	9.36 a.m.	11.36 a.m.	1.39 p.m.	3.34 p.m.
" Longmore - D	9.43 a.m.	11.43 a.m.	1.46 p.m.	3.41 p.m.
" Deaconess	9.52 a.m.	11.52 a.m.	1.55 p.m.	3.50 p.m.
" Elsie Inglis	10.04 a.m.	-	2.07 p.m.	-
" Public Health	10.22 a.m.	-	2.25 p.m.	-
Department	10.26 a.m.	-	2.29 p.m.	-
" R.V. Dispensary	10.26 a.m.	-	2.29 p.m.	-
" Family Doctor	10.28 a.m.	-	2.31 p.m.	-
Centre - D	10.28 a.m.	-	2.31 p.m.	-
Candlemaker Row				
Arrive Medical Buildings	10.30 a.m.	11.57 a.m.	2.33 p.m.	3.55 p.m.
Leave Royal Infirmary	11.08 a.m.	12.08 p.m.	3.03 p.m.	4.06 p.m.
Arrive Western General	-	12.28 p.m.	-	4.33 p.m.
<u>NORTH VAN</u>	<u>Round 1.</u>	<u>Round 2.</u>	<u>Round 3.</u>	<u>Round 4.</u>
Leave Western General	8.45 a.m.	11.11 a.m.	-	3.07 p.m.
" Northern Gen.	8.54 a.m.	11.31 a.m.	-	3.21 p.m.
" Biochem.	-	11.45 a.m.	-	-
" Leith Hospital - D	-	11.45 a.m.	-	-
" Eastern General	9.20 a.m.	11.55 a.m.	1.06 p.m.	3.47 p.m.
(arrive)				
" Leith Hospital - D	9.36 a.m.	-	1.22 p.m.	4.03 p.m.
" Western General	9.55 a.m.	-	1.44 p.m.	-
" Northern General	10.09 a.m.	-	1.58 p.m.	4.15 p.m.
" Royal Victoria	-	-	2.08 p.m.	-
" C.E.R. Unit	10.28 a.m.	-	2.23 p.m.	-
Arrive Medical Buildings	10.31 a.m.	-	2.26 p.m.	-
" Waverley Station	10.40 a.m.	-	2.40 p.m.	-
" Western General	11.02 a.m.	-	2.57 p.m.	4.29 p.m.

<u>BACK SHIFT</u>	<u>Round 1.</u>	<u>Round 2.</u>	<u>Saturdays only</u>
Leave Western General	2.45 p.m.	7.00 p.m.	1.00 p.m.
" University	-	7.14 p.m.	-
" Corstorphine - D	3.00 p.m.	-	-
" Sighthill Health Centre	3.10 p.m.	-	-
" Royal Infirmary	3.35 p.m.	7.20 p.m.	-
" R.H.S.C.	3.40 p.m.	-	1.20 p.m.
" West House	3.50 p.m.	-	1.30 p.m.
" Western General	4.10 p.m.	-	2.00 p.m.
" Royal Infirmary	-	-	2.20 p.m.
" Chalmers	-	7.22 p.m.	2.20 p.m.
" Bruntsfield	-	7.30 p.m.	2.30 p.m.
" R.H.S.C.	5.25 p.m.	7.35 p.m.	2.35 p.m.
" Astley Ainslie	-	7.40 p.m.	2.40 p.m.
" West House	-	7.50 p.m.	2.50 p.m.
" City Hospital - D	-	8.00 p.m.	3.00 p.m.
" P.M.R.H.	5.00 p.m.	8.15 p.m.	3.15 p.m.
" Southfield	-	8.25 p.m.	3.25 p.m.
" Liberton	-	8.30 p.m.	3.30 p.m.
" Longmore - D	-	8.40 p.m.	3.40 p.m.
" Deaconess	5.35 p.m.	8.50 p.m.	3.50 p.m.
" Elsie Inglis	5.45 p.m.	9.00 p.m.	4.00 p.m.
" Eastern General	6.05 p.m.	9.15 p.m.	4.15 p.m.
" Leith Hospital	6.15 p.m.	9.25 p.m.	4.25 p.m.
" Northern General	6.20 p.m.	9.35 p.m.	4.35 p.m.
" Western General	-	9.40 p.m.	4.40 p.m.
" Royal Infirmary	-	9.55 p.m.	4.55 p.m.
" University	-	-	5.00 p.m.
Arrive Western General	6.25 p.m.	10.15 p.m.	5.20 p.m.

MIDLOTHIANLaboratory Van Collecting Service

<u>Collection Centre</u>	<u>Collection Time</u> (Monday to Friday)
Leave Edenhall Hospital .. .. .	1.15 p.m.
DALKEITH .. .. .	1.30 p.m.
Surgery: Dr. R. Robertson 17 Buccleugh Street, Dalkeith Tel: Dalkeith 2371	
NEWTONGRANGE .. .. .	1.37 p.m.
Newbattle Group Practice (Dr. A. Black) "Blackcote", Mayfield, Dalkeith. Tel: Dalkeith 2668	
BONNYRIGG .. .. .	1.52 p.m.
Ashfield Service Station (Prop: H.W. Stephens) 56 High Street, Bonnyrigg Tel: Lasswade 2247	
LOANHEAD .. .. .	2.05 p.m.
Surgery: Dr. D.M. Alston The Fountain, Loanhead. Tel: Loanhead 228	
PENICUIK .. .. .	2.18 p.m.
Surgery: Dr. A. Livingston 91 John Street, Penicuik. Tel: Penicuik 262	
CURRIE .. .. .	2.40 p.m.
Surgery: Dr. B.J. Brown 159 Lanark Road, West Currie Tel: Pentland 2100	

Collection CentreCollection Time  
(Monday to Friday)

JUNIPER GREEN .. .. . 2.45 p.m.

Surgery: Dr. J.M. Ross  
 489 Lanark Road, Juniper Green  
 Tel: Colinton 3380

CITY HOSPITAL .. .. . 2.55 p.m.

Laboratory  
 Greenbank Drive, Edinburgh, 10  
 Tel: Morningside 1001

ROYAL INFIRMARY OF EDINBURGH .. .. . 3.05 p.m.

Haematology and Biochemistry Departments  
 Lauriston Place, Edinburgh, 3.  
 Tel: Fountainbridge 2477

UNIVERSITY OF EDINBURGH .. .. . 3.10 p.m.

Bacteriology Department,  
 Teviot Place, Edinburgh, 8.  
 Tel: Newington 2542

EAST LOTHIANLaboratory Van Collecting Service

<u>Collection Centre</u>	<u>Collection Time</u> (Monday to Friday)
Leave Roodlands Hospital .. .. .	10.30 a.m.
EAST LINTON .. .. .	10.45 a.m.
Dr. J.D. Brown, Surgery: "Kiloven", East Linton Tel: East Linton 204	
DUNBAR COTTAGE HOSPITAL .. .. .	11.02 a.m.
Tel: Dunbar 2303	
NORTH BERWICK .. .. .	11.34 a.m.
Dr. J. MacDonald, "Garve", Beach Road, North Berwick Tel: North Berwick 2169	
GULLANE .. .. .	11.49 a.m.
Chemist: J.P. Sinclair Roseberry Place, Gullane Tel: Gullane 2248	
EAST FORTUNE HOSPITAL .. .. .	11.58 a.m.
Laboratory Tel: Athelstaneford 244	
ROODLANDS HOSPITAL .. .. .	12.09 p.m.
Haddington Tel: Haddington 3182	
Leave Roodlands Hospital .. .. .	1.15 p.m.
TRANENT .. .. .	1.36 p.m.
Dr. A.D. Mitchell, Surgery: Church Street, Tranent Tel: Tranent 697	

<u>Collection Centre</u>		<u>Collection Time</u> <u>(Monday to Friday)</u>
PRESTONPANS .. .. .		1.43 p.m.
Mary Murray Institute East Loan, Prestonpans Tel: Prestonpans 298		
EDENHALL HOSPITAL .. .. .		1.52 p.m.
Porter's Lodge, Musselburgh, Tel: Musselburgh 2546		
UNIVERSITY OF EDINBURGH .. .. . (Connecting with Edinburgh Specimen Van Service)		2.20 p.m.
Teviot Place, Edinburgh Tel: Newington 1011		
ROYAL INFIRMARY OF EDINBURGH .. .. .		2.30 p.m.
Lauriston Place, Edinburgh Tel: Fountainbridge 2477		
WESTERN GENERAL HOSPITAL .. .. .		on request only
Bacteriology Department, Crewe Road, Edinburgh. Tel: Dean 1311		
ROODLANDS HOSPITAL .. .. .		3.15 p.m.
EAST FORTUNE HOSPITAL .. .. .		3.40 p.m.





AREA B

The Border Counties and Southern parts  
of the Counties of Peebles and Berwick

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AREA BPeel Hospital, GalashielsLaboratory Services

Hospital and Laboratory - Tel: Galashiels 2295 (OTW6 - 2295)

Laboratory hours

Monday to Friday: 9 a.m. - 5 p.m.

Saturday: 9 a.m. - 12 noon

Emergencies

Outside normal working hours a duty technician can be contacted through Peel Hospital.

General

Specimens must be correctly labelled with the patient's full name, address and date of withdrawal and a completed request form must accompany each specimen. There are different request forms for Haematology, Biochemistry, Bacteriology, Histology and Blood Transfusion. It is important that relevant clinical data, probable diagnosis and details of treatment are included.

Reports

Urgent reports only will be telephoned. Further information on points not covered in these notes can be obtained by contacting the laboratory.

Van Service

Specimens are collected from the Borders Hospitals by van as follows. Specimen containers, swabs and slides are available at these hospitals or can be obtained from Peel Laboratory.

Gordon Hospital	}	Mon. & Thurs. morning,
Duns Hospital		leaving Gordon Hospital
Whitchester Hospital		at 8.30 a.m.
Coldstream Cottage Hospital		

Kelso Cottage Hospital	)	Mon., Wed., Thurs.
Jedburgh Cottage Hospital	)	
Hawick Cottage Hospital	)	leaving Kelso at
Selkirk Cottage Hospital	)	10.30 a.m.
Galashiels and Sanderson Hospital		Every morning Mon. - Fri.
Peebles War Memorial and County Hospital		Mon. & Thurs. 2 p.m.

### BACTERIOLOGY

General For protection of laboratory staff, all containers of infective material (e.g. sputum, pus) must be securely closed and any evidence of contamination of the outside will result in the container and contents being sterilised without further examination.

Throat swabs are routinely cultured for haemolytic streptococci and diphtheria bacilli. Examination for Vincent's organisms and yeasts will be made if specially requested.

Nasal swabs are normally examined for haemolytic streptococci and staphylococci. If diphtheria is suspected a special note should be made on the request form. When swabbing for staphylococcal carriers the swab should be taken from the anterior nares (the "picking" area).

Whooping Cough Pernasal swabs are used for isolation of Bordetella (Haemophilus) pertussis and can be obtained from Peel Laboratory on request. They should be passed backwards through the nose so as to swab the nasopharynx.

Sputum An early morning specimen should be collected in a sterile container. Examination for tubercle bacilli will only be made if specially requested.

Serous fluids and exudates These will be cultured for general pathogens. Examination for tubercle bacilli will be made if specifically requested. Cytological examination can be carried out if requested, provided that the specimen reaches the laboratory without undue delay.

Pus, Discharges and Exudates A specimen of the pus or fluid (10 - 20 ml. if possible) in a sterile universal container is preferable to a swab.

It is important that the possibility of tuberculosis or actinomycosis should be stated on the request form if examination for these organisms is desired.

Conjunctival swabs These should be sent in Stuart's transport medium.

Vaginal swabs These will be normally examined for Trichomonas vaginalis and Monilia. Where examination for the former is desired the swab should be sent in Stuart's transport medium. If the case is one of suspected puerperal infection or septic abortion this should be stated, and high vaginal or cervical swab taken under direct vision (i.e. with the aid of a speculum).

N. gonorrhoeae Vaginal swabs will not be examined for this organism as, in the female, a properly taken cervical swab is essential. Swabs should be sent in Stuart's transport medium and a smear made on a slide for microscopy. The smear should be fixed by gentle heat until the slide is just too warm to touch.

Cerebrospinal Fluids Pathogens such as the meningococcus are delicate organisms so the specimen must reach the laboratory without delay. The following examinations are made routinely; cell count, protein content, cultures is appropriate. The possibility of tuberculous infection should be stated on the request form.

Urine specimens Early morning specimens are preferable. In the male the glans is washed with soap and water and a mid-portion specimen of urine collected in a sterile universal container. In the case of the female, the vulva is cleaned with soap and water, the perineal area is dried, wiping from front to back to avoid contamination from rectal and vaginal secretions, and a mid-portion of urine collected in a sterile container and sent to the laboratory.

Urine is a culture medium and unless the specimen can be sent to the laboratory immediately it should be refrigerated.

Specimens of Urine for Tuberculosis Investigation The entire early morning specimen from the patient should be sent on 3 successive days. Microscopy and culture will be carried out and positive cultures will be reported as soon as they appear, usually in 3 weeks. Negative cultures will not be reported for 8 weeks.

Faeces These should be sent in sterile plastic containers. The samples will be cultured for pathogens of the Salmonella and Shigella groups, and in the case of children under 5 years old for enteropathogenic Esch. coli ("B.coli"). If food poisoning is suspected this should be stated on the request form and, if possible, the suspected food should be sent with a note of the symptoms and time delay between consumption of the food and onset of symptoms.

Blood culture Two types of blood culture bottle are provided, one containing tryptose broth for general use, the other containing bile salt broth for isolating organisms of the enteric group only. 5 ml. of blood should be injected through the rubber diaphragm in the screw cap. Details of any antibiotic therapy should be given. Outside normal laboratory hours the culture bottles may be placed in the incubator inside the front entrance of the laboratory.

Serological Tests 10 ml. of blood in a sterile universal container.

The following tests are available:

- (1) Syphilis Flocculation Reaction, Wassermann reaction and Kahn test.
- (2) Gonococcal complement fixation test.
- (3) Paul Bunnell test. Positive results are reported after absorption with guinea pig kidney in order to eliminate agglutination occurring in serum sickness and in some normal persons.
- (4) Widal reaction. Sera are tested for agglutinins against S. typhi, S. paratyphi B, Br. abortus and Br. melitensis. It is important that details of previous TAB immunisation be given and any visits abroad noted.
- (5) Rose Waaler and Latex tests for rheumatoid arthritis.
- (6) Thyroglobulin antibody.
- (7) Anti-nuclear factor.
- (8) Serological tests for virus infections - the laboratory or the Virology Department, Edinburgh University Medical School (Tel: NEWington 1011, Ext. 2251) should be contacted.
- (9) Leptospiral agglutination tests, Toxoplasma dye and complement fixation tests. The laboratory should be contacted.

## HAEMATOLOGY

1. Blood counts 4 ml. of blood should be placed in a sequestrene bottle. The bottle should be gently shaken to ensure mixing of the blood and anticoagulant. A blood film should be made and submitted with the specimen. The following examinations can be done on this specimen:

Haemoglobin, R.B.C., W.B.C., P.C.V.,

E.S.R., Reticulocyte count, platelet count,

Absolute values.

2. Investigation of suspected haemorrhagic diseases

The laboartory should be contacted.

3. Examination for L.E. cells Special bottles containing glass beads can be obtained from Peel Laboratory. 5 - 10 ml. blood should be added to the bottle which is then shaken thoroughly for at least ten minutes and sent immediately to the laboratory.

4. Prothrombin Time Blood should be added to the mark on the tube which should be inverted several times to mix the anticoagulant and the blood.

5. Vitamin B12 estimations 20 ml. of clotted blood in a sterile universal container. Patient should not have received antibiotics or sulpha drugs for at least 3 days prior to taking the specimen.

6. Blood Transfusion 5 ml. of blood in a plain universal container. If more than 3 days elapse between successive transfusions a fresh sample of blood will be needed for cross matching the second transfusion. It is important that particulars of previous transfusions and, in the case of females, any history of haemolytic disease of the newborn in the children be entered on the request form. When packed cells are required as much notice as possible (at least 48 hours) should be given and the blood used within 24 hours of receipt.

7. Antenatal Serology A second specimen should be sent at 28 - 32 weeks from Rh. negative women and those with a history of previous transfusion. If tests on this second specimen are negative a third sample should be sent at 36 weeks, as antibodies may only be detectable late in pregnancy. In the case of Rh. positive patients with no history of transfusion the second specimen should be sent at 32 weeks and no third sample is necessary. It is important to remember that immunisation is not confined to Rh. negative women and is relatively common in Rh. positive women who have been transfused.

POST MORTEM EXAMINATION

The laboratory should be contacted.

CLINICAL CHEMISTRY

The table headed "Assays on Blood" which appears on page 7 of the General Section is applicable to Peel Hospital, except that serum transaminases are reported in International Units per litre.

Normal values:	S.G.O.T.	4 - 20 I.U. per litre
	S.G.P.T.	2 - 15 I.U. per litre





AREA C

West Lothian Area

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AREA CBangour General HospitalBroxburn, West LothianLaboratory Services

Hospital and Laboratory. Tel: Dechmont 334 (DE 66 334).

Laboratory hours:

Monday to Friday: 9 a.m. - 5 p.m.

Saturday: 9 a.m. - 12 noon

Introduction

These notes have been compiled for the information and guidance of Family Doctors in collecting and submitting specimens for examination in the Clinical Laboratories, Bangour General Hospital.

General

All specimens must be labelled with the patient's full name, address and date of withdrawal. A properly completed request form, appropriate to the laboratory concerned, must accompany each specimen. Most laboratory reports involve the expression of an opinion by a graduate member of the laboratory staff. It is only possible for him to do so from an informed standpoint if all relevant clinical data are in fact given on the request form. It is essential that this contains a brief clinical history, together with the probable diagnosis. It is imperative that details of previous and current therapy be included.

Collection of specimens

A collection of specimens by van from various centres in the West Lothian region is agreed in principle by the Regional Hospital Board, Practitioners will be notified of collection arrangements as soon as a vehicle is made available.

Emergencies

In the case of urgent or emergency investigations outwith normal working hours, a duty technician is available. He can be contacted via the hospital telephone operator.

## Information

If in doubt or in need of advice regarding the submission of any specimen, do not hesitate to visit or telephone the appropriate section of the laboratory.

Telephoned requests for reports should be restricted to genuinely urgent situations. Frequent interruption by the telephone is the enemy of accuracy in the laboratory.

## Bacteriological Examinations

1. Throat swabs are cultured routinely for all common throat pathogens including C. diphtheriae. Where Whooping Cough is suspected, a per-nasal swab (obtainable from the laboratory) should be used.
  2. Exudates and Swabs thereof from body cavities, wounds etc. are cultured routinely for aerobic and anaerobic pathogens. It is preferable to send pus in a container rather than on a swab. Culture for tubercle bacilli is made only in these cases where the accompanying clinical summary indicates possible tuberculous infection.
  3. Rectal swabs are to be used only when a specimen of faeces is not readily obtainable.
  4. Eye swabs Swabbing is not a satisfactory method of sampling conjunctival flora. Where possible, conjunctival specimens should be taken directly on a sterile platinum loop and inoculated immediately on to culture media. If this is not possible, a swab placed immediately into Stuart's transport medium (obtainable from the laboratory), is an acceptable alternative.
  5. Vaginal swab cultures generally provide no useful information to the clinician except in cases of suspected puerperal infection or septic abortions. In cases labelled "Vaginal Discharge" microscopic examinations only will be undertaken for monilia and for Trichomonas vaginalis. Where the latter organism is suspected it is imperative that the swab be transported to the laboratory in Stuart's medium.
- Vaginal swabs will not be examined for the Gonococcus. In the female a properly taken cervical swab is essential for the isolation and accurate identification of this organism.
6. Sputum It is important that sputum and not saliva is submitted for examination. Specimens should be collected in a sterile universal container. Any evidence of leakage from the cap contaminating the outside of the container will lead to its being immediately destroyed without examination of the contents.

7. Faeces Faeces are normally cultured for pathogens of the Salmonella of Shigella groups. In cases where examination for pathogenic Esch. coli, staphylococci, tubercle bacilli or other organisms is required, a specific request to this effect must be made together with reasons for the request.

In cases of suspected protozoal or helminthic infestations it is usually sufficient to send a specimen of stool in a polystyrene container. A perianal sellotape specimen is required when threadworm infestation is suspected.

8. Urines Mid-stream or catheter specimens of urine are normally examined microscopically as well as being cultured for common pathogens. Relevant culture results can only be obtained if the urine reaches the laboratory within a short time of voiding. Where delay for a period longer than an hour is unavoidable, the specimen must be refrigerated.

9. C.S.F. Examinations These are routinely examined for cytology and biochemistry and where applicable cultures are made.

For successful culture of important pathogens, e.g. meningococcus, the C.S.F. must be received by the laboratory without any delay whatsoever.

10. Blood cultures Bottles of broth are provided by the laboratory. As far as possible two or more blood cultures should be taken before antibiotic therapy is commenced. In all cases it is imperative that details of previous antibiotic therapy is given.

Outwith normal laboratory hours, blood culture bottles should be placed in the incubator in the laboratory entrance hall.

11. Serological Tests For the following tests, 10 ml. of clotted blood should be submitted in a sterile universal container.

- (a) W. R., Kahn and Cardiolopin Tests.
- (b) Widals. Unless otherwise requested, sera will be tested against S.typhi, S.paratyphi B, Br. abortus and Br. melitensis.
- (c) Antistreptolysin O titre.
- (d) For other serological procedures e.g. Viral and Leptospiral agglutinations, Toxoplasma dye and C.F.T., Rheumatoid Factor, Antinuclear Factor, Thyroglobulin antibody etc., the laboratory must be contacted.

12. Pregnancy Diagnosis An immunological test is carried out. For this, 30 ml. of the first morning urine is required. It need not be a mid-stream urine. Details of age, L.M.P. and reason for test must accompany the specimen.

Pregnancy diagnosis test should only be carried out in special circumstances. It is not possible for the laboratory to offer this service for routine uncomplicated cases.

There is also a Regional Pregnancy Diagnosis Service based at the Simpson Memorial Maternity Pavilion, for details see page 13.

13. Fungus infections Skin scrapings or hair stumps should be placed in a dry sterile universal container. Several fragments of skin are required.

### Haematological Examinations

#### 1. Submission of specimens for routine examinations:

2.5 ml. blood should be submitted in a sequestrene bottle. Blood should be added to line and the bottle should be gently shaken to ensure mixing of blood and anticoagulant. When a blood specimen cannot be sent to the laboratory within 2-3 hours a film should be made and submitted with the specimen.

The following examinations can be done on this sample:-

Haemoglobin, R.B.C., W.B.C., E.S.R., P.C.V.

Reticulocyte Count : Platelet Count

Determination of absolute values (M.C.V. & M.C.H.C.).

#### 2. Estimation of bleeding time and clotting time:

The laboratory should be contacted.

#### 3. Examination for L.E. (lupus erythematosus) Cells:

Blood should be placed in a special bottle containing glass beads, mixed thoroughly for at least 10 minutes and sent immediately to the laboratory.

#### 4. Vitamin B<sub>12</sub> Estimation

20 ml. clotted blood required in a sterile container.

Patient should not have received antibiotics or sulphas for at least 3 days prior to taking specimen.

### Blood Transfusion Arrangements

Where blood or blood products are required for transfusion purposes, the Haematology Department should be contacted.

In the case of Obstetric emergencies, the existing arrangement for calling the "Flying Squad" stand.

### Autopsies

These will be done at Bangour General Hospital, by arrangement with the Pathologist.

Written consent for post-mortem examination, signed by the nearest relative, together with a clinical summary, should be sent to the Pathologist.

### Clinical Chemistry

The table headed "Assays on Blood" which appears on page 7 of the General Section is applicable to the Bangour laboratory, except that the slightly different normal ranges in use are given on the back of each report form.

### Prothrombin Time Estimations

Special tubes are issued by the laboratory for this test. Blood should be added exactly to the level indicated by the mark on the label of the tube. Specimens should reach the laboratory with the minimum of delay.







